

ANIMAL KINGDOM.



Date _____
Page _____

The classification also helps in assigning a systematic position to newly described species.

Basis of Classification:

used as a basis of "animal classification".

- ① Arrangement of cells
- ② Body symmetry
- ③ nature of coelom.
- ④ Patterns of reproductive system.

In spite of differences in str. & form of different animals, there are these fundamental features common to various individuals in relation to.

Patterns of
• reprod. syst.
• circulatory syst.
• digestive system

Priced

BAN

Body symmetry

Arrangement of cells

nature of coelom

Arrangement of cells

Arrangement of cells

→ level of organisation:

(all members of animalia - multicell.)

- ① Cellular level. → Loose cell aggregates i.e. Sponges (Porifera)
Some division of labour (activities) occur among the cells.
- ② Tissue level → Arrangement of cells is more complex. cells performing same functions.
many
Eg. Coelenterata (Ctenophora)
- ③ Organ level → Each organ is specialised for a particular function.
Eg. Platyhelminthes & other higher phyla. (organs & organ system)
- ④ Organ syst. level → Organs associated → funct. system.
Aschelminthes too. specific phys. & logical funct. each system.
Eg. Annelids → chordates

Organ system in different groups of animals exhibit various patterns of complexities.

Eg. Digestive syst.

Blind sac.
Only a single opening to the outside of body serves as both mouth & anus.

Eg. Platyhelminth. Coelent. Ctenophora
Incomplete digestive system.

Tube within tube
Two openings mouth & anus.
Eg. Aschelminth. Chordate
Complete digestive syst.

→ Symmetry:

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NCERT THREAD NOTES

- 1) Asymmetrical: Sponges
- 2) Radial: Coelenterates, Cnidaria, Adult echinoderms
- 3) Bilateral: Arthropods, annelids, platyhelminthes.
body divided to identical left & right halves in only one plane.
chordates
any plane passing through central axis divides org. in two identical halves.

Eg. Circulatory System.

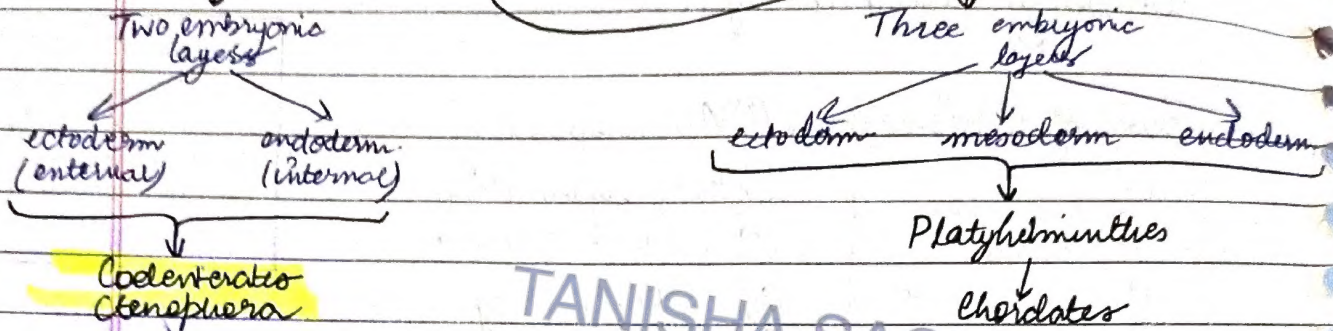
Open type.
Blood pumped out of the heart & cells & tissue directly bathed in it.

Closed type.
Blood circulated through a series of vessels of varying diameters (artery, vein, capillaries)



Date _____
Page _____

→ Diploblastic / Triploblastic Organisation :



* An undifferentiated layer - mesoglea present b/w ecto & endo

→ Coelom

Imp * Presence or absence of a cavity b/w body wall & gut wall is a very imp. classification.

Body cavity → lined by mesoderm → coelom

Animals possessing coelom → Coelomates

Eg. annelids to chordates

Pseud. coelom In some animals, body cavity is not lined by mesoderm. Cavity is lined, mesoderm scattered in pouches b/w ecto & endoderm.

↳ pseudocoelom → pseudocoelomates
Achelminthes

In some animals, coelom/body cavity absent → Acoelomates
Acoelomate me body cavity hi nhi hote.

Eg. Platyhelminthes

→ Segmentation :

Metamerism: Body is externally & internally divided into segments with a serial repetition of at least some organs.

Eg. Earthworms (Annelids)
↓
Metamerism (phenomenon)

→ Notochord :

Mesodermally derived / red like / on dorsal side during embryonic development.

Chordates

Chordata

Non-chordates

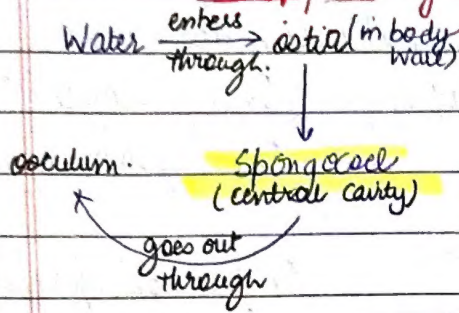
Porifera
→ Echinoderms

PORIFERA

- Members: Sponges
- Habitat: Generally marine
- Symmetry: Mostly asymmetric.
- * "Primitive multicell. animals"

Level of org: Cellular

- * Have water transp./canal syst.



- Pathway of water → ① food gathering, ② Resp. exchange, ③ Removal of waste
- Spongocoel → lined by choanocytes / collar cells. Also the canal is lined by these collar cells.

Paragastric cavity

- Digestion: Intracellular
- Skeleton: Supports the body
→ Of spicules / spongin fibres

- Sex: Hermaphrodite
- Reproduction: → Asexually → Fraggm.
→ Sexually → Form of gametes

- Fertilization: Internal
- Development: Indirect

Larval stage which is morphologically distinct from adult.

- Eg. Sycon - Scypha
- Spongilla - Fresh water sponge
- Euspongia - Bath sponge

CNIDARIA

- Habitat: Aquatic (mostly marine)
- Locomot.: Sessile or Free living
- Symmetry: Radial

- * Cnidoblast / Cnidocytes → present on tentacles & body. They contain the stinging capsule called nematocysts.

- Funct. of cnidoblasts: Anchorage, Defense, Capture of prey

Level of org: tissue level.

Embryonic layers: Diploblastic

Central cavity: gastrovascular cavity (with single opening)
Mouth on the hypostome.

Digestion: Extracellular & Intracellular

Corals: Skeleton of $CaCO_3$

Cnidarian's Body form

- | Polyp | Medusa |
|--------------------|------------------------|
| • sessile | • Free swimming |
| • cylindrical | • Umbrella shaped |
| Eg. Hydra, Adamsia | • Aurelia / Jelly fish |

* These Cnidarians which exist in both forms exhibit alternation of generation (Metagenesis) - Obelia

Polyp usually → Medusa, Medusa Sexually → Polyp

- Eg. Physalia - Portuguese man of war
- Adamsia - Sea anemone
- Pennatula - Sea pen
- Gorgonia - Sea fan, Meandrina - Brain coral.

CTENOPHORA

- Common name : Sea walnut / comb jellies
- Habitat : Exclusively marine
- Symmetry : Radially
- Level of org : Tissue level of org.

★ Body bears → 8 external rows of ciliated comb plates. help in the locomotion

- Digestion : Extra cellular intra

★ Bioluminescence (the prop. of a living org to emit light). well marked here.

- Hermaphrodite
- Reproduction → Only sexual
- Fertilization - external
- Development - Indirect

Eg. Pleurobrachia
Ctenophora.

PLATYHEMINTHES (Flatworms)

- Body : Dorsoventrally flattened
- Habitat : Mostly endoparasite found in → animals human beings

- Symmetry : Bilateral
- Embryonic layer : Triploblastic
- Coelom : Acoelomate

- Level of org : Organ level mostly
~~little~~ Organ system level

★ ① Hooks } → On parasitic forms
② Sucker }
Some of them absorb food directly through their body surface.

Flame cell → osmoregulation
 ↘ excretion

- Hermaphrodite
- Fertilization : Internal
- Development : Indirect

Eg. Planaria (possess high regeneration capacity)

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NCERT THREAD NOTES

Are pseudocoelomates & include parasitic as well as non-parasitic roundworms

ASCHELMINTHES (Roundworm)

* Circular

Habitat: Free living

Aquatic

Terrestrial

Parasitic in plants & animals.

Level of org: Organ system level

Symmetry: Bilateral

Embryonic layers: Triploblastic

Coelom: Pseudocoelomate

Digestive System: Complete

* With a muscular pharynx (well-developed)

* An excretory tube removes body waste from the body cavity through excretory pore

Sexes: Separate

* Often females are longer than males.

Fertilization: Internal

Development: Direct or Indirect

Eg. Ascaris - Round worm

Wuchereria - Filaria worm

Ancylostoma - Hookworm

annulus: little ring

ANNELIDA

Habitat: aquatic (marine & fresh water)

Terrestrial

Free living

Sometimes parasite

Level of org: Organ system level

Symmetry: Bilateral

Embryonic layers: Triploblastic

* Circulatory system: Closed

* Metamerism

Coelom: Coelomate

Body: Body surface distinctly marked out into segments / metameres

* They possess longitudinal & circular muscles which help in locomotion

Aquatic nervous - annelids

Nervous

Possess lateral appendages, PARAPODIA

Help in swimming

Nephridia → osmoreg. & excretion

Nervous system: System

paired ganglia lateral nerve Double ventral nerve cord

Reproduction: Sexual

Eg. Nereis - dioecious

Earthworm & leech - Monoecious (Pheretima) (Hirudinaria)

blood sucking leech.

characterized by presence of jointed appendages

ARTHROPODA

Largest phylum

includes insects

- * Over 2/3rds of named species on earth are arthropods.

Level of org: Organ system level

Symmetry: Bilateral

Embryonic layer: Triploblastic

Body 8 segmented

head
Thorax
Abdomen

Coelom: Coelomate

Excretion: Through malpighian tubules

- * Body covered by chitinous exoskeleton.

Sex: Mostly dioecious

- * Have jointed appendages.

Fertilisation: Internal (usually) b/w these two

- Respiratory organs

→ Gills - Prawn & Crab
→ Book gills - Limulus
→ Book lungs - scorpion spider
→ Tracheal system.

- Development: ~~Mostly~~ Direct/Indirect both

- Circulatory syst. - open

- Sensory organs - Antennae

- * Mostly oviparous eyes → comp. simple organism.

Statocysts / balance organ

MOLLUSCA

2nd Largest phylum

Habitat: Terrestrial

Aquatic → marine
→ Fresh water

Level of Org - Organ syst. level.

Symmetry - Bilateral

Cell layers - Triploblastic

Coelom - Coelomate

Body covering - Calcareous shell

Body - Unsegmented.

with
Distinct head Muscular foot Visceral hump
A soft, spongy layer of skin forms mantle over visceral hump.

Space in two - mantle cavity

has feather like gills functions

Respiratory Excretory

- Anterior head region

→ has sensory tentacles

- Mouth contains

→ File-like rasping organ for feeding, called radula.

- Sex: Dioecious

- Oviparous

- Development: Indirect.

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NCERT THREAD NOTES

possess spiny skin

ECHINODERMATA

Endoskeleton - Calcareous ossicles
hence

[Echinodermata]

spiny bodied

- Habitat : Marine
- Level of org : Organ system
- * Adult echinoderms - radially symmetrical.
- Larva echinoderms - Bilaterally symmetrical.

- Cell layer : Triploblastic
- Coelom - Coelomate
- Digestive system - complete

Mouth
on lower
ventral

Anus
on upper
dorsal.

- Most distinctive feature -
Water Vascular System

Locomotion

Capture
of food

Transport
of food

Respiration

- Excretory system - Absent
- Reproduction - Sexual
- Fertilization - Usually external.
- Development - Indirect

with a free swimming
larvae

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HEMICHORDATES

* This phylum was earlier considered as sub-phylum under the phylum chordata.

But now placed under non-chordata.

* These have a rudimentary str. in the collar region called Stomochord
→ a str. similar to notochord.

This phylum has small grp of worms
marine
(Habitat)

Level of org - organ system level.

Symmetry - Bilateral

Cell layer - Triploblastic

Coelom - Coelomate

Body - Cylindrical

composed of

Anterior
proboscis

Collar

long
trunk

• Circulatory system - Open type

• Respiration - Gills through

• Excretory organ - Proboscis gland

• Sex - Dioecious

Fertilization - External

Development - Indirect

Example - Balanoglossus / Sacoglossus.

CHORDATES

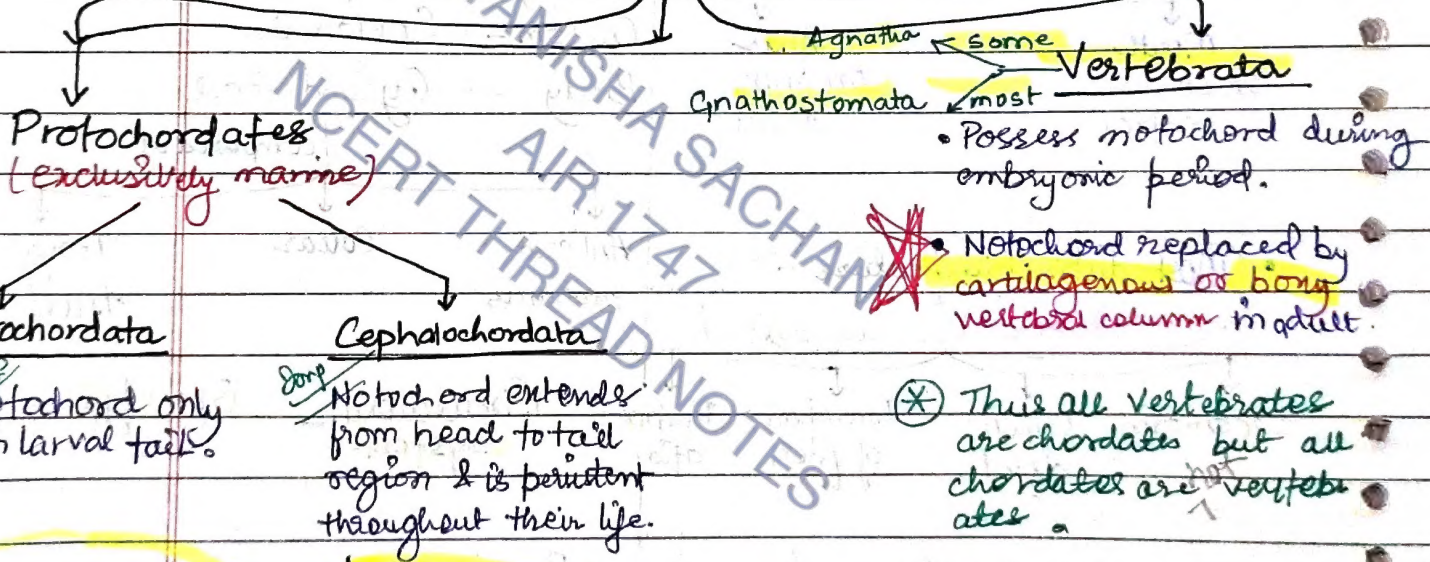
Fundamentally characterized by

- a presence of a notochord
- a dorsal hollow nerve cord
- Paired pharyngeal gill slits

- Symmetry: Bilateral
- Cell layers: Triploblastic
- Coelom: Coelomate
- Level of org: Organ syst. Level.
- Circulatory system: Closed.
- * Post anal tail present

Chordates	Non-chordates
Notochord present	Notochord absent.
gill CNS - ① dorsal, ② hollow, ③ single	gill CNS - ① Ventral, ② solid, ③ double
• Pharynx - Perforated by gill slits	• Gill slits absent.
• Heart - Ventral	Heart - dorsal.
• Post anal tail - present	Post anal tail - Absent.

Chordata → divided into 3 subphyla



Example

- Ascidia
- Salpa
- Doliolum

Urochordata

Example

- Branchiostoma (Amphioxus / Lancelet)

Cephalochordata

Amphioxus

Vertebrates has

- Ventral muscular heart
- Two, three, four chambered
- Kidney for excretion
- Paired appendages → Imbres → fins

Cyclostomata ^{→ Agnatha} ^{→ most primitive chordates}

All the living members - ectoparasite on some fishes

Body - elongated, Devoid of scales, paired fins

Respiration - 6-15 pairs of gill slits

Mouth - Sucking, Circular without jaws

Cranium & Vertebral Column - Cartilaginous

Circulation - Closed type

Habitat - Marine

(but migrate for spawning to fresh water,

After spawning, within few days they die,

their larva after metamorphosis return to the ocean.)

Example: Petromyzon
(Lamprey)
Patola

Myxine
(Hagfish)
Myha

Pisces

CHONDRYCTHIS

→ Notochord persistent throughout the life.

- Marine
- Streamlined body with Cartilaginous endoskeleton
- Mouth ventral
- Gill slits separate & without operculum. (5) Pairs
- Skin tough with minute placoid scales which are backwardly directed.
- Their jaws very powerful, hence these are predaceous.
- X absence of Air bladder they have to swim continuously to avoid sinking.

OSTEICHTHYES

- Marine + Freshwater
- Body streamlined with bony endoskeleton
- Mouth terminal
- Gill slits covered by operculum. (4 pairs)
- Skin covered with cycloid/ctenoid scales.
- Air bladder present which regulates buoyancy.

Heart → 2 chambered → ^{aorta} → ^{ventricle}
↳ cold blooded (Poikilothermal)
(lack capacity to regulate their body temp.)

Heart → 2 chambered → ^{aorta} → ^{ventricle}
↳ cold blooded (Poikilothermal)

Diocious

Fertilization internal.

Many of the viviparous.

Diocious

Fertilization external

Mostly oviparous (direct developement)

* Some of them have "electric org" (eg. Torpedo)

"Poison sting" (eg. Trygon)

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AMPHIBIA

"amphi: duos"

"bios: life"

→ Habitat → aquatic
→ terrestrial

* **Oviparous** → 2 auricles
→ Heart - 3 chambered → 1 ventricle
→ Develop. - Indirect

* Most of them have 2 pairs of limbs.

→ Body divisible → head
→ trunk

→ sexes - separate
→ Fertilization - external

* Tail may be present in some.

* The amphibian skin is moist (without scales).

* Eyes have eyelids.

* Tympanum represents the ear.

* Alimentary canal, urinary & reproductive tracts open into a common chamber, called cloaca, which opens into exterior.

* Respiration is by gills, lungs & through skin.

Examples → Bufo (Toad) → Lethyophis (Limbless amphibian)
→ Rana (Frog)
→ Hyla (Tree frog)
→ Salamandra (Salamander)

REPTILIA → Limbs absent

- * Class name refers to "creeping" or "crawling mode" of locomotion.
- * Latin, *repere* / *reptum*: creep / crawl.
- * Habitat - Mostly terrestrial

- * Body covered by dry & cornified skin.
② epidermal scales or scutes.

- * They do not have external ear openings.
- * Tympanum represents ear.
- * Limbs, when present, two pairs

- * Heart - 3 chambered (usually) { crocodiles: 4 chambered }
- * Blood: Poikilotherms

- * Snakes and Lizards shed their scales as skin cast.

- * Sexes: Separate.
- * Fertilization: Internal.
- * Development: Direct
- * Oviparous.

AVES

- * Characteristic feature: Presence of feathers

Most of them can fly but some are flightless birds (eg: Ostrich)

- * Forelimbs $\xrightarrow[\text{into}]{\text{modified}}$ Wings

Hindlimbs → have scales → modified for

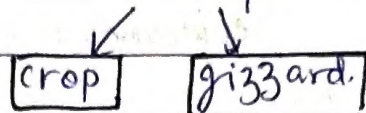
- ① Walking
- ② Swimming
- ③ Clipping the tree
- ④ Perching branches.

SKIN: Dry without glands except oil gland at the base of the tail.

Endoskeleton: Fully Ossified (Bony)

* Long bones are hollow with air cavities (pneumatic).

Digestive tract: Has additional chambers



Heart: Completely 4 chambered.

Blood: Warm Blooded / Homeotherm

Respiration: By lungs

Air sacs connected to lungs supplement respiration.

Fertilization: External Internal

Sexes: Separate

(*) Oviparous

Development: Direct

MAMMALIA

In variety of habitats

- ① Grasslands
- ② polar ice caps
- ③ Deserts
- ④ mountains
- ⑤ forests
- ⑥ dark caves

Some of them adapted to
 → fly
 → live in water.

* Most unique mammalian characteristic: Presence of milk producing glands (mammary gland) by which young ones nourished.

They have 2 pair of limbs for

- ① walking, running
- ② climbing
- ③ burrowing
- ④ swimming
- ⑤ flying

Skin of mammals - unique - possessing hair.

* External ears / Pinna present.

Different types of teeth present in jaw.

Heart: 4 chambered.

Blood: Homiotherms

Respiration - By lungs

Sexes - Separate

Fertilization - Internal.

(*) Viviparous (with few exception)

Development - direct.

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NCERT THREAD NOTES

Phylum	Level of Organisation	Symmetry	Coelom	Segmentation	Digestive System	Circulatory System	Respiratory System	Distinctive Features
Porifera	Cellular	Various	Absent	Absent	Absent	Absent	Absent	Body with pores and canals in walls.
Coelenterata (Cnidaria)	Tissue	Radial	Absent	Absent	Incomplete	Absent	Absent	Cnidoblasts present.
Ctenophora	Tissue	Radial	Absent	Absent	Incomplete	Absent	Absent	Comb plates for locomotion.
Platyhelminthes	Organ & Organ-system	Bilateral	Absent	Absent	Incomplete	Absent	Absent	Flat body, suckers.
Aschelminthes	Organ-system	Bilateral	Pseudo coelomate	Absent	Complete	Absent	Absent	Often worm-shaped, elongated.
Annelida	Organ-system	Bilateral	Coelomate	Present	Complete	Present	Absent	Body segmentation like rings.
Arthropoda	Organ-system	Bilateral	Coelomate	Present	Complete	Present	Present	Exoskeleton of cuticle, jointed appendages.
Mollusca	Organ-system	Bilateral	Coelomate	Absent	Complete	Present	Present	External skeleton of shell usually present.
Echinodermata	Organ-system	Radial	Coelomate	Absent	Complete	Present	Present	Water vascular system, radial symmetry.
Hemichordata	Organ-system	Bilateral	Coelomate	Absent	Complete	Present	Present	Worm-like with proboscis, collar and trunk.
Chordata	Organ-system	Bilateral	Coelomate	Present	Complete	Present	Present	Notochord, dorsal hollow nerve cord, gill slits with limbs or fins.

Dice
Aschelmin

Annelid

Arthropod

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NCERT THREAD
NOTES

VI

(sex + reproduction)

fertilisation?

devel.

1) <u>Cnidaria</u> →	Show both sex and asex. repro.	<u>Ext</u> (Plasmodium)	Indirect	Cnidoblast
2) <u>Ctenophora</u> →	Bisexual (only sex)	Ext. fert.	Indirect devel.	Bioluminescence; Colloblast/Larvocytes
3) <u>Platyhelminthes</u> →	Unisexual Bisexual (show regeneration)	Int. fert.	Indirect devel. (many larval stages)	Flame cells (osmoregulation & excretion)
4) <u>Aschelminthes</u> →	Unisexual	Int. fert.	Direct or Indirect devel.	Well devel. muscular pharynx.
5) <u>Annelida</u> →	Nereis → Unisexual Earthworm → Bisexual Leeches	Int/Ext	Indirect	Parapodia (swim.) Nephridia (excretory)
6) <u>Arthropods</u> →	Unisexual	Int. fert. (oviparous)	Direct or indirect	Chitinous exoskeleton, Malpighian tubule.
7) <u>Molluscs</u> →	Unisexual	Ext. fert. (oviparous)	Indirect devel.	Radula; head, foot & visceral (unsegmented body) hump
8) <u>Echinoderm</u> →	Unisexual	Ext. fert.	Indirect devel.	Water vascular system
9) <u>Hemichordata</u> →	Unisexual	Ext. fert.	Indirect devel.	Proboscis, collar and trunk.

After aschelminthes (including it) unisexual starts only coelom & coelomous body.

11) Chordata → (A) Vertebrata.

a.) <u>Cyclostomata</u> →	Unisexual	Int. fert.	Indirect
b.) <u>Chondrichthyes</u> →	Unisexual	Int. fert.	(viviparous)
c.) <u>Osteichthyes</u> →	Unisexual	Ext. fert.	Direct (ovip.)
d.) <u>Amphibia</u> →	Unisexual	Ext. fert.	Indirect (ovip.)
e.) <u>Reptilia</u> →	Unisexual	Int. fert.	Direct (ovip.)
f.) <u>Aves</u> →	Unisexual	Int. fert.	Direct (ovip.)
g.) <u>Mammalia</u> →	Unisexual	Int. fert.	Direct (vivip.)